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DEPARTMENT OF COMMERCE

UNITED STATES BUREAU OF MINES
SCOTT TURNER, DIRECTOR

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ECONOMIC ASPECTS OF GOLD AND SILVER

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DEPARTMENT OF COMMERCE - BUREAU OF MINES

ECONOMIC ASPECTS OF GOLD AND SILVER[1]

A Review of Recent Publications by the United States Bureau of Mines, together with Three Papers, by its Director

The monetary metals, gold and silver, have recently been the object of such general interest that the United States Bureau of Mines has received many inquiries regarding them. Though requests for technologic information have been numerous, they have been exceeded in number by those concerned with economic aspects of these metals. The nature of the latter communications indicates that the public is not generally aware that various Bureau publications are available which deal with the economic situation of gold and silver. For this reason, it is deemed advisable to present a brief résumé of the papers which are obtainable from the Bureau or the Superintendent of Documents, together with the text of three articles recently prepared by the Director, reprints of which are not otherwise available.

The Bureau of Mines compiles figures showing mine production of gold and silver, by districts and States, and cooperates with the Bureau of the Mint in determining the total annual output in the United States as a whole.[2]

It recently established an annual canvass to determine the consumption of silver in the arts and industries of the United States, and published an economic paper covering such use in 1928 and 1929,[3] followed by an information circular[4] on silver consumption by industry during the 2 years subsequent. A 4-year record is thus provided for those interested in utilization of silver.

The Bureau has also published summarizations of all available data upon world production since 1493 of gold[5] and of silver.[6]

It has, furthermore, rendered available a compilation of production-data of silver mines of the world, and an analysis of it, showing the proportions of silver and other metals contained in all the ores from which silver is derived.[7]

All of these papers are concerned solely with putting into readily usable form statistical data and other factual material; they do not offer theories or express opinions upon controversial questions related to these metals.

Three other recent papers concerned with gold and silver are presented below in order to put them in shape for distribution by the United States Bureau of Mines. All three of them are by the Director of the Bureau. It should be noted that these papers do not commit the Bureau of Mines to any partisan position either for or against various proposals and opinions of others. They are merely reviewed as factual material, the bringing together of which may prove of service to students of the monetary metals as such.

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[1] The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from U.S. Bureau of Mines Information Circular 6740."

[2] Dunlop, J.P., Gold and Silver: An annual chapter of Mineral Resources of the United States, published by the U.S. Bureau of Mines.

[3] Merrill, C.W., Consumption of Silver in the Arts and Industries of the United States: Econ. Paper 14, Bureau of Mines, 1932, 18 pp.

[4] Merrill, C.W., Silver Consumption in the Arts and Industries of the United States in 1930 and 1931: Inf. Circ. 6647, Bureau of Mines, 1932, 7 pp.

[5] Ridgway, R.H., Summarized Data of Gold Production: Econ. Paper 6, Bureau of Mines, 1929, 63 pp.

[6] Merrill, C.W., Summarized Data of Silver Production: Econ. Paper 8, Bureau of Mines, 1930, 58 pp.

[7] Merrill, C.W., Economic Relations of Silver to Other Metals in Argentiferous Ores: Econ. Paper 10, Bureau of Mines, 1930, 29 pp.

GOLD[8]

Probably the word gold is used more frequently in the language of metaphor than in direct reference to the metal itself. It will be found employed thus many times in almost any book, and it recurs constantly in our daily speech.

We refer to a Golden Age, a golden hour, a golden memory, the Golden Rule, and to silence that is golden. A golden fleece inspired the Argonauts to adventure; a Golden Edict granted rights to an oppressed people. There is a golden mean of conduct; the word of an honest man is as good as gold. There are golden voices, opportunities and opinions.

Things are said to be as pure as gold; a voice resembles liquid gold; worthy people have hearts of gold. Many uses of the word refer to its color and metallic luster, as golden sunset, golden hair, golden grain. Thus the word is employed to suggest not only a lustrous yellow metal, but purity, value, worth, merit, perfection, beauty, and other similar qualities that indicate the high esteem in which this element has long been held.

Yet gold is a metal, as iron, copper, lead, zinc, aluminum, and tin are metals. It resembles all of them in a general way, some of them closely; even its color can nearly be matched by brass, a mixture of copper and zinc, or by bronze, a compound of copper and tin.

Why then is gold so valuable and so important? Certainly not because it is yellow, heavy, malleable, ductile, and lustrous. The explanation is that this one metal is endowed with a particular combination of properties that made possible its ancient discovery, and led to its early utilization, to widespread longing for its possession, and finally to its use as a measure of worth and as a means of storing value for the future.

The human desire that results in gold being so highly prized is as old as history. It has persisted through thousands of years. During perhaps a hundred centuries, while nations rose and fell, as conflicting philosophies, religions, and the languages in which they were expressed, waxed and waned, mankind agreed in this at least: Every one wanted gold. This desire was paralleled in intensity and persistence only by the craving for food and other necessities of life, for which gold could be exchanged at will.

Throughout the ages, can man have been mistaken in his esteem of gold? Was he infatuated and beguiled by its yellow glitter, though not by the gleam of brass and bronze? Assuredly not. Though he was not aware of the numerous factors that jointly created gold's value, he was competent to judge whether a little gold would serve him as well, or better, for certain purposes, than many times its weight of brass or bronze, - and he decided that it would.

One reason for his choice was his observation that, with gold, he could buy not only brass or bronze, but any other commodity, whenever he chose to do so, and that he need not hurry to trade it away, as he did when he invested in perishable commodities or those that cost something to store and keep; gold gave command of time. Man knew that until he decided what should be bought with this gold, he could secrete it or transport it more easily than other commodities of equal worth. In his purse, he could carry enough to pay for all the grain many beasts-of-burden could carry. Gold was so indestructible that if buried, it would not rust; even if melted by fire, it would still remain the pure bright metal. If its possessor traveled to a distant land where people spoke an alien tongue, they would nevertheless understand the worth of the gold he offered them in trade.

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[8] A radio address delivered by Scott Turner March 10, 1933, over the Columbia System, under the auspices of Science Service.

Gold was more stable in value than other commodities; all others varied more widely and more rapidly in price. Oversupply of many of them, due to seasonal production, was followed by depletion and dearth, because they were gradually consumed. The effect on prices is illustrated by the low cost of grain after harvest and the high price before it, or by the charge for fish after and before an unusual catch. Gold, however, was neither consumed nor supplied in great excess. Withdrawals and returns of gold, from and to circulation, tended to balance in the long run; if its value began to decrease because of oversupply, export of gold to other places, where it would buy more, tended to occur because it was so easily transported.

Hence, its price was fixed less by local than by wide demand, and it was, therefore, more stable in relation to the mean of prices in general. The superior steadiness in the value of gold was naturally prized by the prudent, who were saving for the future and for old age. Just as insurance funds are invested to provide security above all else, so men of the past who wanted a store for future use sought gold in preference to other commodities as the means to this end.

For these and similar reasons, it was not illogical that man used gold long before there was money. It was easily beaten into the desired form, and its softness helped to save it for special purposes, since it was not hard enough to be generally useful and was therefore reserved for ornaments. As its esteem for personal decoration grew, it naturally went from the weaker to the stronger, from the tribesman to the chief, and so it was hoarded and saved.

Almost precisely the same circumstances applied to silver after its discovery, which was later than that of gold; both metals had been employed in barter and trade, as preferred mediums of exchange, long before the first coin was made, and ages before our present monetary systems began to evolve from the use of gold and silver money. At an early date, however, much larger stocks of silver than of gold must have accumulated, because the price of the former appears to have been only a fifth of the price of gold when mining of silver was begun by the Athenians.

The monetary systems of the present have marvelous social utility, but they should not be deemed more remarkable than the automatic evolution of exchange in earlier times through the use of gold and silver, from which financial methods were, in turn, evolved.

The early basing of commodity-exchange upon metal was induced by prehistoric man's discovery of so-called placer deposits of gold in stream-beds of Asia, Africa, and Europe. Indestructibility and high specific gravity of the metal were important factors. In many such deposits, the gold could be seen readily, as it was in 1848 when discovered in Caifornia. Placer gold may occur in tiny flakes or grains, or in nuggets of considerable size. One nugget found in California weighed nearly 1,600 ounces. Another in Australia exceeded 2,000 ounces; it was revealed by the rut made by a wagon wheel. A savage would hardly ignore such a nugget even though he had no previous knowledge of this metal. Leo Africanus, writing during the Middle Ages of a king who lived on the Gold Coast of Africa, described him as using a huge nugget of gold as a seat.

Gold is identified more readily than other metals, because they usually occur in nature in chemical compounds; the property of gold that keeps it bright and free from tarnish likewise prevents it from passing into solution, and from combining readily with other elements. It is relatively imperishable. That is why it is found concentrated in placers as a bright native metal. Glittering objects catch the eye of animals; gleaming gold must have attracted instantly the attention of primitive man. It is presumed to have been the first metal discovered by human beings, though there are no records to prove it. We only know that gold was already established in use and in the esteem of man when history began.

Two other things about gold have probably been important. It is widely distributed about the earth's surface, as it occurs to some extent in nearly every country. This would tend to make all peoples acquainted with it sufficiently to account for its widespread acceptance. The other is the fact that nowhere is gold extremely abundant. Most of the time, before the present century, the increase in accumulated stocks of the metal throughout the world proceeded slowly, and the amount added each year was not sufficient to disturb the value of gold, especially as the addition would tend to be balanced somewhat by growth of population and by expansion of trade. The latter accounts for the ready absorption of enormously expanded production of gold in recent years, without pronounced effects in inflation.

The whole fascinating story of gold, covering its occurrence, discovery, production and use, its influence upon progress and civilization, on history, the struggle of man to conquer his environment, and upon his mind, oriented to gold as a symbol of individual, national and social well-being, concerns an astonishingly small amount of this precious metal. All the gold produced in the world since the discovery of America, which probably exceeds vastly the total in the ages before, could be contained in a cube measuring less than 40 feet on each edge. In weight, this amounts to only about 38,000 short tons; over fifty times that weight of copper was produced in the single year, 1929.

Think of the work and effort, the rivalry and strife, the injustice and oppression, the schemes and plots, the quarrels and fights, the battles and wars that have been involved in the accumulation and preservation, the winning and owning, of this relatively small amount of yellow metal!

A one-inch cube of gold is worth about $210; if an infantryman in the United States army carried the weight of his standard battle equipment of 71 3/4 lbs., in gold, he would have $21,600 worth - enough for a cube 4.7 inches on an edge. If you could carry 250 lbs. on your back, you might walk away with a little over $75,000 worth of gold, which would make a cube a trifle larger than 7 inches on an edge. If you owned a 9-inch cube of pure gold, you would have over $150,000.

In more than 3 1/2 centuries, from the discovery of America to about 1850, only 151 million ounces of gold had been produced in the entire world; but in the next 82 years, ending with 1932, 959 million ounces or 6 1/2 times as much, was produced at a rate 28 times as fast. The earlier production came from placer mines or from gold mines that could not be worked far below the surface. Now the amount from placers is small in comparison with that from veins; vein-mines sometimes extend a mile and a half into the earth, this having been made possible by recent technologic advances in the art of mining; the story of the winning of gold is not yet finished.

You might not know that the greatest gold mine in the United States is in South Dakota; it is called the Homestake. Alaska contains the second largest. You would rightly guess that more gold has come from California than any other State. Canada produces more gold than we do; in fact, last year the Province of Ontario alone was the source of more gold than the whole of the United States. The greatest producer in Canada is the Lake Shore mine; the Hollinger stands second. About half of the gold won annually in all the world comes from the Union of South Africa; nearly two hundred and forty million dollars worth was won there last year. The greatest African mine is called Government Gold, with the Crown mine a close second. Either produces nearly 3 times as much as our largest mine.

Truly it may be said that there is a golden thread running through the embroidered tapestry of history, from dim prehistoric figures of men trading nuggets, to our own financiers and leaders of industry conducting vast transactions based upon minted gold; but it should not be overlooked that this filament of gold is interwoven throughout with one of silver, and that silver is now employed as the basis of money by Eastern peoples as numerous as those of the West who use gold for the same purpose.

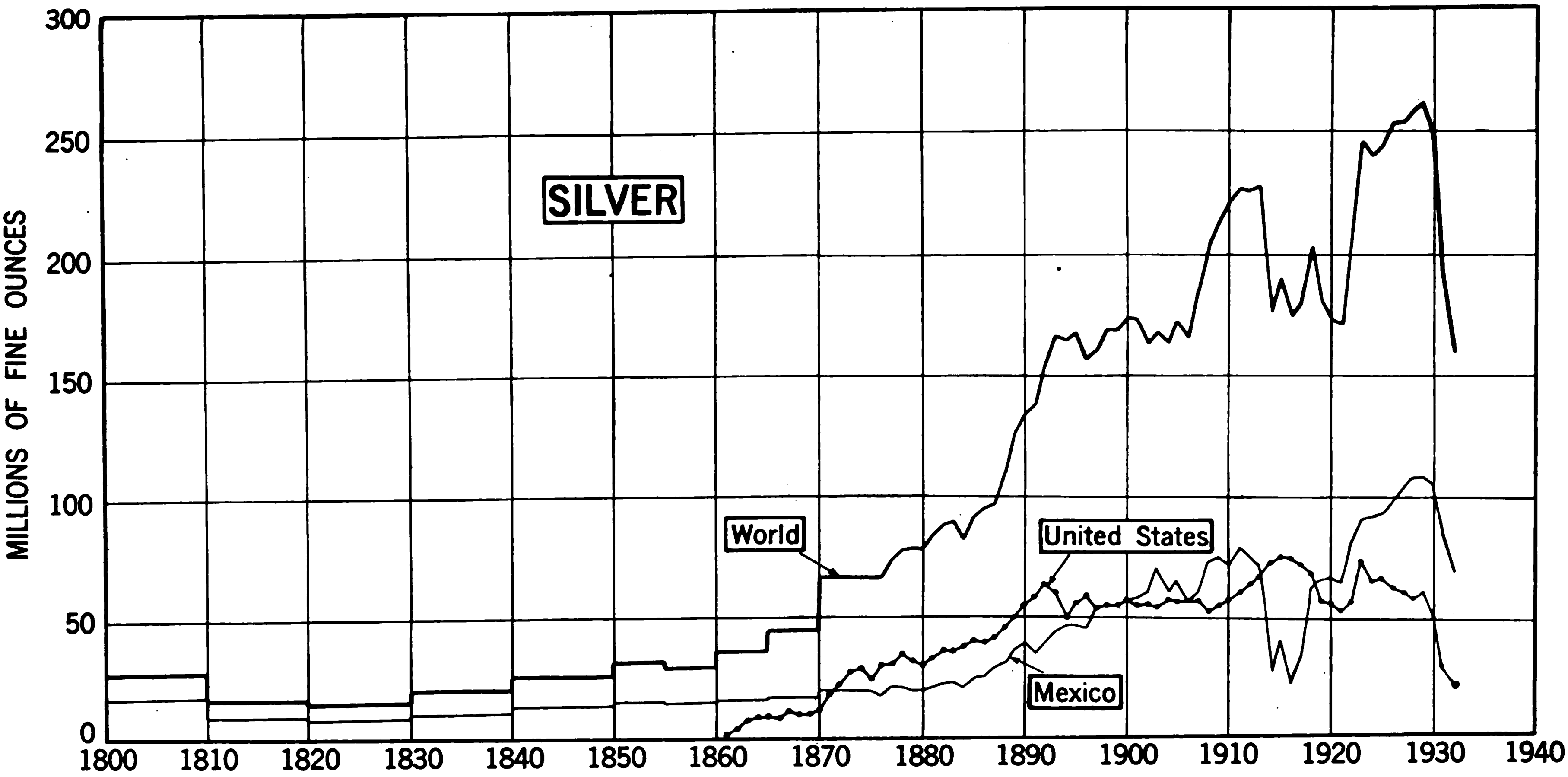

Figure 1.—Silver production since 1800.

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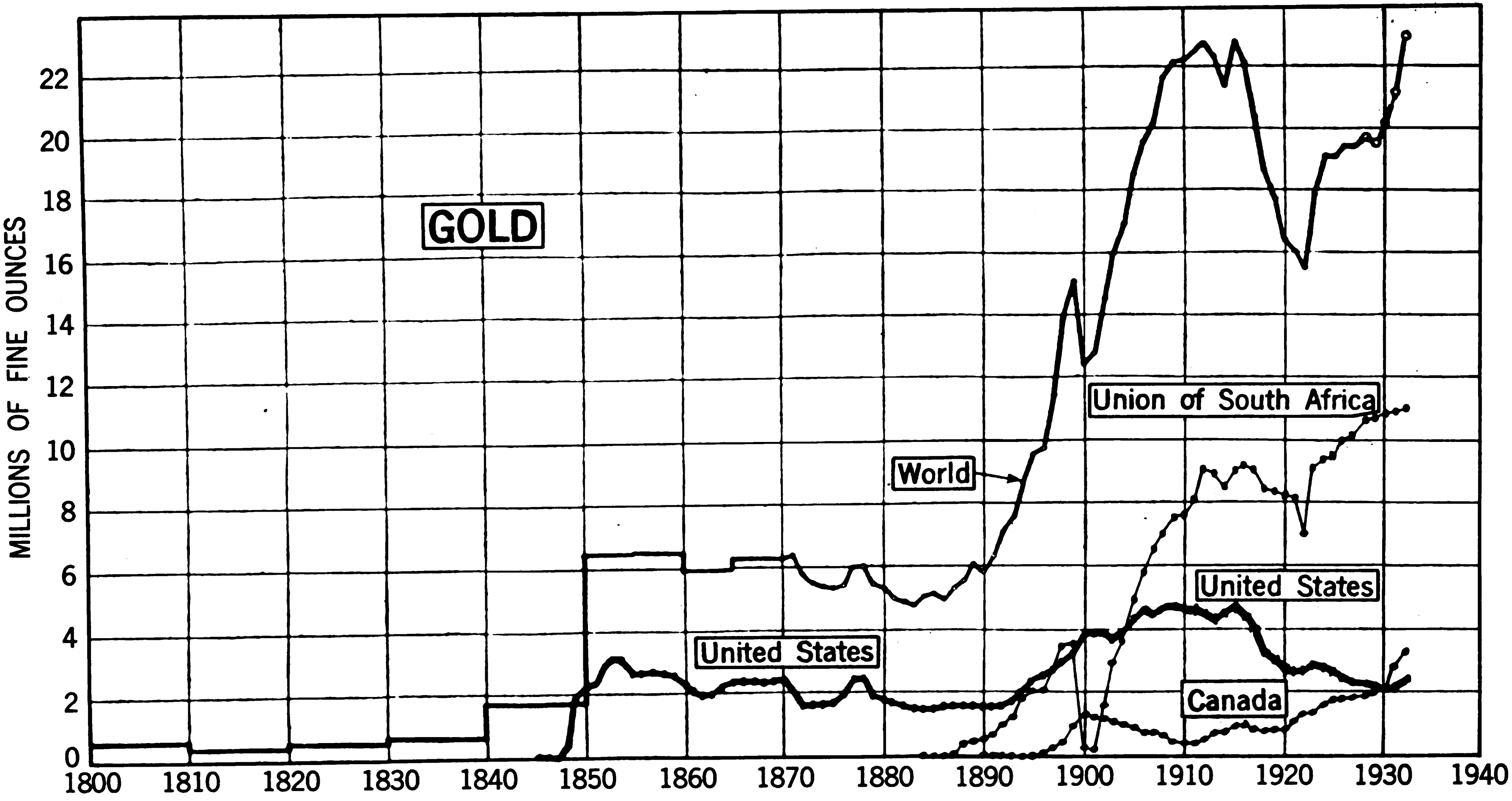

Figure 2.—Gold production since 1800.

THE BEST YEAR FOR GOLD AND THE WORST FOR SILVER[9]

Gold and silver, the monetary metals, have presented in the last year a striking contrast; gold has experienced unusual prosperity, while silver has been depressed more severely than ever before. Gold mining has been hailed as the only basic industry that is able to thrive on depression; the new gold produced is thought by many to be the most important material for the reconstruction of prosperity. Silver production, meanwhile, has been sinking to its level of 40 years ago (see fig. 1), and its price to a level never before recorded. These factors have reduced the value of silver produced in 1932 to about the value of the average annual production more than a century ago, that of the decade 1801-10. No other major commodity in world trade appears to have suffered a greater decline during the present depression.

A long upward climb of gold production culminated in 1915 when 22,718,000 ounces were produced (see fig. 2). By 1922, world output had decreased 32 percent to 15,467,000 ounces, but recovery from this level was rapid in 1923 and 1924. In 1929 the upward trend was again resumed, with the result that the output for 1932 will approximate that for 1915 and it is virtually certain that 1933 will attain a new all-time record in gold production.

The expansion of gold mining during a period when other industries have been hard pressed to survive has seemed a paradox, though the explanation is obvious, the gold-mining industry being unique in that its product finds an unlimited market at a fixed price. In countries where the gold standard has been maintained, the depression has greatly aided gold production; labor has grown more plentiful and more proficient, while the cost of supplies has declined. In Canada and some other countries the gold miner has been even more fortunate, because the suspension of the gold standard has given him a premium in terms of currency. Though financing of most other kinds has grown difficult, that for gold-mining enterprises has been more readily effected.

Not for a generation have there been so many men available for prospecting for new deposits. Although much has been said about the modern gold-seeker's lack of training and experience, it is well known that the ranks of present-day prospectors include many old-timers, as well as unemployed miners, mining engineers and geologists, who provide instruction for eager newcomers in the gold industry. It is reasonable to hope for substantial returns from these endeavors. although the average reward to individual prospectors may be small.

So far, the principal source of increased production has been expanded operations at going mines. In some mines, this has resulted from more rapid development of well-defined ore deposits. In others, where the limits of the orebodies vary with the fluctuations in mining costs, there has been a great increase in ore reserves, thus making feasible expansion of plant and production of metal. This doubtlessly accounts for the fact that, in spite of reduced output of byproduct gold, particularly from copper and silver mines, there has been no appreciable decrease in gold production in any country except Mexico. Even in the United States, where the copper miners have faced the severest curtailment of their history, gold production has continued to increase.

There is no commodity of which the available stocks so overshadow the current production as gold, unless possibly it is silver. The international movements of gold consequently are much greater than those required for the distribution of the annual output. In fact, except for regular flows of gold such as that from Johannesburg to London, the movements of newly-mined gold are almost completely obscured by the movements of stocks of gold from one banking center to another. Almost as much gold left New York during the single month of October 1931, as was produced in the world during that year and gold shipments of fabulous size have been taking place between the banking centers of Europe.

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[9] Annual review by Scott Turner when President of the American Institute of Mining and Metallurgical Engineers; Mining and Metallurgy, January 1933.

Perhaps the most striking of the gold flows has been that from India to Europe. From earliest times, it has been assumed that India's appetite for gold was insatiable. Gold has been referred to as "a metal dug in Africa and buried in India." Nevertheless, since Great Britain suspended the gold standard, India has disgorged gold at a rate which in December 1931, exceeded new-gold production. In fact, the exports from India for the first year that the gold standard was suspended have totaled more than one half of the world's new-gold output during the same period.

Probably no commodity has its economic status so completely regulated by legislation as gold. Its price in the United States is one of the few reference points which has resisted completely the forces of depression. The Government still offers to sell its 200,000,000 ounces of gold at $20.67 an ounce, and to buy unlimited quantities at the same price.

The laws affecting gold in other countries have not proved to be as unyielding as those of the United States. Some nations have abandoned the gold standard; others have suspended its operation; still others have passed ordinances that have impaired the status of gold by prohibiting its export. Only four or five countries besides the United States have maintained the gold standard in its full sense. Although abandonment, suspension, or other impairment of the gold standard would be expected to decrease the demand for gold and cause the metal to become too plentiful, gold has not grown cheap in terms of goods. Apparently the high regard for gold as a standard of value has increased with world-wide economic adversity.

In contrast with the prosperity of gold mining, silver mining has sunk to new depths of depression. The value of the 1932 silver output of the United States will fall below that of any year since the Civil War, and the trend in other countries is similar. The decline in total value of silver produced is due not alone to its low price, but also to the curtailment of operations in the lead, copper, and zinc-mining industries of which silver is a byproduct. Although the effect of production curtailment in base-metal mines abroad has not been so effective in diminishing silver output as in the United States, it has been an important factor. While the price of silver remains so low that most straight silver mines cannot be operated at a profit, the silver output will be chiefly determined by the production from silver-bearing lead, copper and zinc ores.

The principal sources of silver, other than the newly-mined metal, have been the monetary stocks of certain European countries and India. The flow of this metal to new hands, however, has been relatively small in amount during 1932, although the fear of larger releases has been depressing to the market for a number of years.

The most interesting features in the silver situation have been connected with legislation, and proposed legislation, affecting its monetary status. Since the debasement of British subsidiary silver coinage in 1920, there has been scarcely a year when silver did not suffer some new shock from legislative enactments. Demonetization of silver and debasement of silver coins, by one country, then another, kept the silver market apprehensive for years, but it was the report of the Indian Currency Commission in 1926 that proved the hardest blow. Since then, continued debasement of coinage, the sales of the Indian Government and the threat of much larger sales, coupled with hard times and political disturbances in the silver-consuming Orient, have driven the price of silver steadily downward. The debasement of coinage, however, must have an end, and there is some hope that the proposed International Economic Conference may result in agreements which will terminate the course of legislative enactments that impair the usefulness of silver as a medium of exchange.

During the last decade, most of the legislation with respect to silver has been unfavorable, but there have been many suggestions for remedying the situation by giving silver a more important functional part in monetary systems. Sentiment in favor of making its price more stable is indicated by the strong support for considering the silver question at the forthcoming international conference.

The year that is now closing has been gold's best and silver's worst year in many decades. There seems to be good reason for believing that the gold industry will be able to maintain its improved position, while increasing activity on silver's behalf promises well for future stabilization of the silver-mining industry in more favorable circumstances than now prevail.

A REVIEW OF RECENT DISCUSSION REGARDING GOLD MONEY[10]

Current opinions in regard to gold's monetary functions are here reviewed dispassionately by the Director of the United States Bureau of Mines. This should prove to be of interest to those now deeply concerned over problems in regard to gold, silver, money, and their mutual relationships, which in former periods of depression induced the "Greenback" agitation of the 1870's and the "Free Silver" campaign during the economic depression near the close of the last century.

Gold, as a unit of measure by which currencies are compared, has been subjected recently to much critical study. A period of falling wages, prices, and rents has led many debtors to feel that the gold standard is oppressive; yet many others have turned to gold and securities redeemable in gold as the one certain means of preserving wealth in an unsettled world. Innumerable plans for regulating prices by freeing them from rigid association with gold's purchasing power have been proposed; likewise, many have earnestly defended the gold standard as indispensable on the ground that its advantages far outweigh its disadvantages. It should be serviceable to summarize some data relative to gold and currencies, and a few of the proposals for remedying the present situation, together with arguments offered in opposition to such changes. A connection between gold and prices is taken for granted.

The wide divergence of opinion as to gold's proper function in the money problem results partly from lack of adequate data upon which to base plans of action, but lack of agreement as to the precise nature of fundamental economic laws is also a factor that often leads to impracticable, or absurd proposals. The lack of agreement in economic theory fortunately is not paralleled with respect to gold statistics of production and monetary stocks. The record of gold production from 1493 to 1927 is generally accepted as that shown in Economic Paper 6 of the United States Bureau of Mines; annual production as given in the Report of the Director of the Mint completes the current record to date. Stocks of gold in monetary use are also detailed each year by the Mint. There is less agreement as to the total of all non-monetary stocks now in existence, but these stocks, being relatively unavailable, are not generally considered an important factor in the monetary gold problem. Consumption of gold is generally estimated as divided about equally between monetary use and non-monetary use, if the latter is defined as including that entering the oriental hoards as well as the arts and industries.

The same agreement exists in the case of silver statistics, except in regard to oriental stocks and their significance. Economic Papers 8 and 10 of the Bureau of Mines summarize past production. The reports of the Bureau of the Mint carry forward the record of current production, presenting in addition precise data on monetary silver stocks of the world. The importance of the stocks of silver money is difficult to estimate, because monetary policies of the Orient have recently been subjected to many changes and the ultimate disposition of vast oriental stocks of silver money remains in doubt. Consumption of silver, like that of gold, is not subject to exact determination, though it is known that the Occident usually

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[10] An Article by Scott Turner, published in Mining Journal, December 1931.

Original from THE OHIO STATE UNIVERSITY

absorbs approximately one fourth of production, which is divided about equally between monetary use and that in the arts and industries. The other three fourths goes to the Orient, but no reliable estimates exist in respect to the proportions absorbed there for monetary uses, or in hoards, or in the arts and industries.

Many recent articles have used the record of the past as background for predicting future trends of gold and silver. Estimates are made of future production of gold and silver and its effect on future prices. The quantities of gold and silver that will be available, or required for support of the commerce of the future, and for arts and industries, are also discussed. The abandonment of all metallic foundation for currencies is advocated by some, while others suggest that platinum should be joined with gold as a basis of money, though it has been pointed out in reply that world stocks of platinum are insignificant in quantity. Before the recent fall in prices, some advanced plans for increasing the efficiency of gold as the basis of credit, while others alleged that the credit structure is already topheavy, and needed either more metal for foundation or a considerable deflation in prices and reduction in the volume of credit.

Included under the plans for increased efficiency in utilization of gold as basis for exchange are those that contemplate a redistribution of the available gold among the nations of the world, or its concentration in some neutral central bank, such as the Bank of International Settlements. Perhaps the simplest of the many plans proposed is the gold-production bonus. This plan has not made much progress though a relatively ineffective bonus plan recently was adopted by the Australian Government. In the United States, there have been proposals of a gold bonus since the World War period, but this movement has lost rather than gained ground in recent years.

PRODUCTION

Gold.- The availability of past and present gold-production records has led to many articles which discuss the future output of gold. Most such articles are dominated by the report by Dr. H. Pirow, government mining engineer of the Union of South Africa, in which he predicts the future production of that country until 1950. His estimate, published in 1929, is as follows:

Year	Estimated value (£) gold output	Year	Estimated value (£) gold output
1930[1]	43,500,000	1940	25,500,000
1931	42,600,000	1941	25,500,000
1932	43,800,000	1942	20,100,000
1933	42,500,000	1943	20,100,000
1934	40,700,000	1944	15,500,000
1935	39,000,000	1945	15,500,000
1936	34,250,000	1946	11,700,000
1937	34,400,000	1947	10,100,000
1938	34,400,000	1948	10,000,000
1939	27,400,000	1949	10,000,000

[1] The actual production in 1930 was valued at £45,520,163.

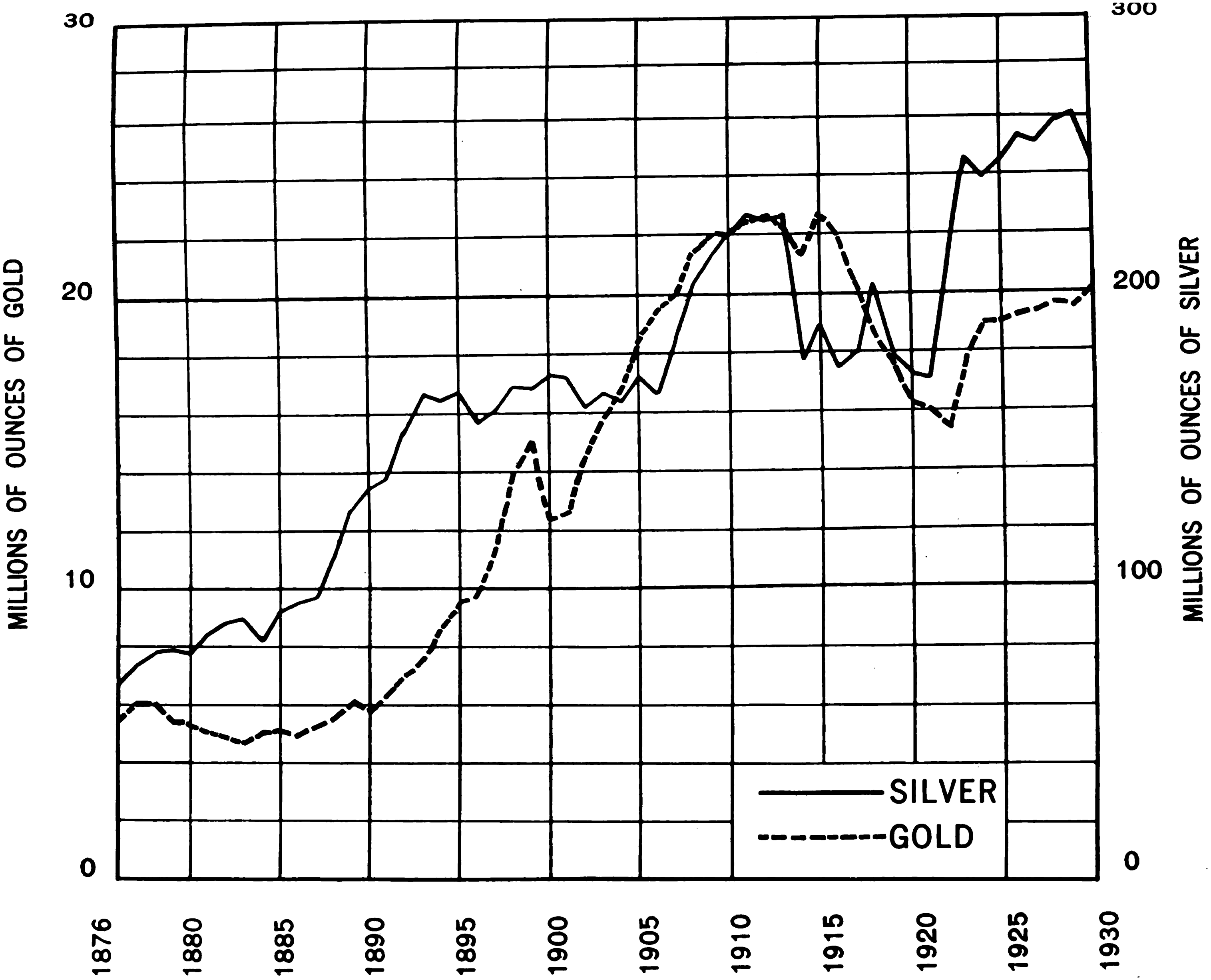

Figure 3.—World production of gold and silver, 1876-1930

Pirow's predicted decline is so great that even the most optimistic observers fail to foresee enough possible increase elsewhere to counterbalance it. This decline, however, is not predicted without certain important qualifications, which have led many writers to prophesy a much larger future output from the Rand than is contained in Pirow's table. It is also pointed out that predictions of an early decline of Rand production have been made almost since mining started there, but that such estimates have soon been discredited by an ever-increasing annual yield. The gold production for 1930 exceeded that for any previous year (see fig. 3), and there is now little possibility that the output for 1931 will fail to set a new high record.

Future production in some of the other important gold-producing areas was estimated for the International Geological Congress which met at Pretoria, Union of South Africa, in June 1929. Only in Canada was a rising gold production predicted. Other countries, for which reports were made, anticipated a declining gold output unless there was either a sharp change in gold-mining costs or there were important discoveries. Many conservative prophets of gold's future, however, seem unable to believe that gold production reached its alltime peak in 1915.

Silver.- Silver production has been increasing during recent years. This has resulted from stabilization of government in Mexico, the increasing production of the metals from ores in which silver is a by-product, and other less important reasons. The peak year of silver production thus far was 1929, with a production of 261,000,000 fine ounces of silver. The decrease in the 1930 silver production was due in part to the lower price for silver, but more notably to the general curtailment in the production of lead, copper and zinc.

It seems to be the consensus of opinion that silver production cannot be greatly affected by price because of its byproduct nature. Because of this, some authorities feel that remonetization of silver would not bring forth an overproduction of the white metal.

It is frequently pointed out that for a long time past the annual production ratios between gold and silver have not been reflected in their corresponding price ratios. Since 1876, total production of these metals is in a ratio of 12.1 of silver to 1 of gold. From the production diagram here reproduced, in which, for this period of more than half a century, gold has been plotted on a scale ten times that of silver, it is apparent that the ratio has frequently been as low as 10 to 1; this is the case whenever the two production lines intersect. These curves, and much of the material includd in this review, originated in the Common Metals Division of the Bureau; Charles W. Merrill is the specialist who has prepared several noteworthy publications of the Bureau dealing with this subject.

It is of further interest to note how these curves reflect historical events; thus, the rapid rise in the curve of gold production from 1890 to 1909 is chiefly attributable to the expansion of South African production; the development of the cyanide process was a large factor. The dip in the curve in 1900 reflects interruption to the South African industry due to the Boer War. The rise in silver production from 1876 to 1893 coincides with the period of maximum development of high-grade silver mines in the United States, to the relative exhaustion of which was due the level course taken by the silver-production line until 1906, when the Cobalt-district production had a pronounced effect. Decrease of silver production from 1914 to 1921 was related to political disorders in Mexico, and, similarly, the subsequent increase of silver production in recent years is largely attributable to the restoration of order in that country.

FUTURE STOCKS OF GOLD

Most authorities agree that world stocks of monetary gold are more important than current production of gold in determining the price level. Monetary stocks, however, are in-

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creased by current production less current consumption of the arts and industries and absorption by hoarding in the Orient. The attitude of holders of monetary stocks of gold also affects the usefulness of stocks. Thus private stocks of the Orient are not reckoned in monetary stocks, because the store of wealth they constitute is relatively unavailable for use in exchange of goods. Some of the Occidental nations have recently been accused of treating monetary stocks of gold similarly, by what is termed sterilization of gold, but this idea seems to be fostered largely by those nations possessing relatively small gold stocks. Sterilization consists in failure to make the entire gold holdings available for the issuance of credit. The United States, France, and Argentina have been named as the principal offenders. Their policy, however, has been vigorously defended as inevitable and unobjectionable. It is held that the workings of foreign exchange have forced acceptance by those countries of unwanted gold, and that they would have suffered considerable inflation of prices if they had allowed their credit to expand to the limit permitted by their present excess of the metal. Their right is alleged to seek control of price levels instead of contributing to adjustment of world flow of goods and gold by permitting domestic inflation of credit. On the other hand, their critics hold that they should either permit inflation or should arrest the flow of gold with foreign loans and through encouragement of imports by a lowering of tariff barriers.

The countries holding the surplus gold claim that tariff rates are their own business, and that lending is determined by the terms responsible borrowers are able and willing to offer, as well as by competing bids for investment funds. Seemingly, the basic cause of much of the difficulty thus indicated had its origin in the World War, which not only destroyed enormous amounts of wealth, but also brought into existence tremendous international debts, payable only in gold. It has been alleged by many that the world is suffering from overwhelming international debts that are incapable of settlement through ordinary processes of adjustment created only to meet the needs of international trade. To liquidate such war-born debts by trade cannot be expected to cause anything but abnormality, as judged by conditions of trade existing before the war.

SUGGESTED SOLUTIONS TO THE GOLD PROBLEM

Seemingly a majority of the world's bankers would refuse to admit the existence of a special gold problem. Bankers usually point out that all banking and trade is constantly faced with problems, among which those concerning gold and its relationships are not extraordinary. On the other hand, those who admit or claim the existence of a gold problem are not at all agreed upon its nature or its solution. Nevertheless, they generally agree that a greater stability of price level, both within nations and between nations, should be a goal of those considering the gold problem. There is also some opinion that the level of prices will not return to that existing just before the present depression unless there is either some unforeseen event of epoch-making proportion or some major change in laws that fix the use of gold as a standard of value, or in the policies adopted by the credit agencies.

Many of the recent proposals or discussions relating to money have included schemes to control fluctuations in the price level; most such schemes continue, nevertheless, to advocate gold as the standard of value. It is the reconciliation of these two desires that makes the problem difficult to solve. Among the solutions offered are: Regulating gold production and consumption by bonuses, taxes, and other forms of governmental interference; adjusting the gold content of the unit of value to offset the commodity index trend; remonetizing silver and monetizing platinum to increase the material upon which credit could be based; decreasing the percent of gold backing required for national currency issues; inducing more nations to use the gold exchange instead of the gold metal basis for currency; removing all gold coins from circulation; setting up a stock of gold in some international bank which could be operated as is the stock of gold controlled by the U.S. Federal Reserve Board for settlement between the member reserve banks; and many other suggestions, most of which detail some minor method of economizing in the use of gold.

The gold bonus and special tax plans naturally receive the support of those who would receive the bonus and the opposition of those who would pay the tax. Usually these two elements succeed in arousing a considerable amount of interest in the subject whenever legislation of this kind is proposed. It seems probable, in fact, that some governments will enact legislation designed to stimulate gold production for monetary purposes. Such legislation, however, seems more likely to take the form of special tax concessions, provision of governmental employes to promote and assist production, reduction in freight rates, creation of credits guaranteed by the public treasury, and lowering of requirements in mining laws applying to the public domain, rather than that of cash bonus payments. It has been pointed out, however, that bonuses doubling production and taxes halving consumption would have little effect on the world's stock of monetary gold, which is huge in comparison with annual production. It has, therefore, been claimed that as an immediate remedy a gold bonus would be more effective in benefiting the miner than in solving monetary difficulties.

Variation of the gold content of the unit of value is advocated by some of those who consider a stable price level the first function of a monetary system. A stable price level is not universally held to be important, and some writers consider it an unwise objective. In order to arrange a variable gold content in the unit of value, it would be necessary to withdraw gold coins as legal tender and to place the currency on a variable gold bullion standard. Under such circumstances, a government commission could adjust the quantity of gold that would be exchanged for the unit of currency. In theory, a rising commodity index level would be met with an offer by the commission to buy or sell gold at a lower price in currency and vice versa. This has been popularly referred to as establishment of a rubber dollar. The transition to such a standard would entail tremendous difficulties, because there are innumerable contracts now in existence that are based on a nonvariable gold standard. Many of these contracts are for long periods of time, such as bonds, notes, mortgages, and other obligations, payable in gold both as to principal and interest. All are familiar with the gold clause contained in so many agreements to discharge obligations in the future which reads, ". . .both principal and interest being payable in the gold coin of the United States of, or equal to, the present standard of weight and fineness . . ." Many authorities claim that the factor of judgment required to determine the gold content of the unit of value would inject greater uncertainty in the execution of long-term contracts than now obtains.

The remonetization of silver and the monetization of platinum proposals aim to increase the store of metal upon which credit could be based. Most objections seem to be founded on fear of any proposal that would add unknown quantities to so fundamental an element of the social structure as the measure of value. There is also emotional prejudice against bimetallism (or trimetallism). No one is prepared to state definitely the extent of reaction of silver production to remonetization. Some authorities claim that there is insufficient gold to provide the silver-using countries with a workable gold standard, and that therefore either bimetallism or a sharp Occidental currency deflation would be a prerequisite to a world-wide standard of value. Others say that so little gold is needed for a gold-exchange basis of currency that the excess of gold in the United States and France would prove more than adequate. This second group apparently favors a double standard in the Orient; that is, a gold exchange system for the Orient's foreign trade, and a silver standard for their domestic transactions. This double-standard system, it is said, would provide for unhindered commerce for their enlightened business men and bankers, and yet leave to the bulk of the population the privilege of the immemorial custom of hoarding precious metals, principally

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silver. This is practically the condition now existing in India. At any rate it seems likely that the deadlock between the Occident's objections to bimetallism and the Orient's faith in silver will block any plan for a world-wide single standard of value for some years to come.

The legal minimum of gold reserves back of currency issues averages about 35 to 40 percent in the countries adhering to the gold standard. Some authorities favor the lowering of this legal limit, or its replacement by some more flexible method of setting the legal minimum. This is strongly opposed by others, who hold that resistance points and definite requirements make for the greatest stability, particularly in times of political stress. This point is of more interest to those countries which are near their lower reserve limits, than to the United States, which has such large gold reserves.

Much less gold is required to maintain a gold exchange basis of currency than a gold basis of currency. For this reason, those who hold that total gold stocks are inadequate for every country to have gold as a basis of its currency favor the adoption of the gold exchange basis by as many countries as possible. This system, which operates much as does the gold standard system except that the currency of gold-standard countries is substituted for gold, is satisfactory from the standpoint of a country's foreign-trade settlements, but does not lend itself to the maintenance of domestic confidence or a high degree of national pride. To obtain gold, a citizen of such a country must demand the currency of some gold-standard country in exchange for his native currency. He must then demand gold in exchange for his foreign credit. Thus it is made very plain to him that certain foreign currencies are superior in convertibility to his domestic variety. It is also obvious that the gold exchange basis of currency doubles the possibility of default, and greatly decreases the gold back of the money. Accordingly, the economy in gold is like many other so-called economies; it is the economy of using inferior goods, which are satisfactory under ordinary circumstances, but which may fail under stress with disastrous results to the user.

It is more economical of gold to circulate paper money than gold. This economy is very important in the case of paper money that is backed by 35 to 40 percent of its face value by gold. In the case of United States gold notes, however, where the gold backing is equivalent to the face value of the issue, the economy is only that of wear on circulating gold coins. These economies have caused many to advocate the withdrawal of all gold coins from circulation. This has been accomplished in some countries by the establishment of a gold bullion standard. Under this standard, the government promises to redeem its paper money in gold bullion of the proper weight and fineness. In Great Britain, where this method was used (prior to September 21, 1931), the minimum quantity of gold that was paid out was 400 ounces. This meant that only a small portion of the population could ever expect to effect a direct redemption of currency in gold. In the United States, under the gold-coin standard, anyone with $5 can demand gold and know that refusal is illegal. Thus the humblest citizen of a solvent gold-coin-standard country is led to place implicit confidence in each of his country's several moneys. Some authorities hold that the gold-coin method is a luxury in which the world can no longer afford to indulge. Others point out that few gold coins are needed in the United States for circulation. They claim that absolute monetary integrity, careful education of the people in the proper use of the various media of exchange, and a vast but close-knit banking system have made it possible to make this standing offer of gold redemption without much probability that it will be accepted except in the most casual way. On the other hand, in times of stress there is always a serious drain of gold in any country adopting the gold-coin standard, as some people do not abandon their faith in the hoarding of gold.

The gold reserves of the United States have been made particularly effective by the organization of the Federal Reserve Bank system. Under this system, gold held at central

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points is transferred from the credit of one member bank to the credit of another member bank, with nothing more complicated than a bookkeeping entry. This avoids the labor and risk formerly incident to the settlement of balances between banks. It is now suggested that some central bank be set up as the joint depository of the gold of gold-standard nations. This idea has gained particular headway since the formation of the Bank of International Settlements, situated in Switzerland. Such a central bank, however, has been opposed by some because they see a lessening of their independence, particularly in time of war. Even under the best conditions, it would probably require many years before such a central bank would accumulate enough gold and build enough prestige to greatly aid in the economy of gold.

For the duration of the depression, and perhaps for some years following it, there undoubtedly will be a continuation of the flood of proposals for altering the monetary systems of the world. Out of these plans there almost surely will come many workable ideas that will be incorporated in improved methods for carrying on the exchange of goods. Although there are many who believe that in view of the existing machinery of credit the connection between the amount of gold and the level of prices is no longer direct or immediate, and there are others who even advocate the divorce of gold from its immemorial function in exchange, nevertheless, there appears to be reason for supposing that gold will continue indefinitely to be the one item in monetary systems by which their other elements will be evaluated.